Virtual Reality: A survey

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Abstract: *Virtual Reality can also refer as virtual environments. Because of the extensive media coverage now days virtual reality has grabbed more attention rapidly. Virtual reality (VR) is a burgeoning field that has the inherent potential of manipulating peoples mind with a superlative 3D experience. This paper provides a short overview on virtual reality. The paper presents a review on virtual reality, history of VR, VR devices , VR application.*

KEY WORDS: Virtual reality, cave, immersive, virtual, reality.

1. INTRODUCTION

Virtual reality comes from the definitions for both 'virtual' and 'reality'. The definition of 'virtual' is near and reality is what we experience as human beings. So the term 'virtual reality' basically means 'near-reality'. This could, of course, mean anything but it usually refers to a specific type of reality emulation. Virtual Reality is an imaginative, illusionist world, which gives the sensation that you are inside the artificial world created through computer software's with simulations. VR works in 3D form where the subject can move in X, Y and Z direction. VR is on immersive medium which transports you in virtual medium. Virtual reality helps to create simulated environment which helped in the innovation of immersive films and the video games[5]. In 1965, Sutherland, the founder of computer graphics, presented in his paper the first virtual reality system called "the ultimate display" which has multi-senses immersion and interaction. Since then, virtual reality has become an area of research in computing graphics and systems.

According to the IEEE standard protocol submitted by the "work group of virtual reality term", virtual reality is the computer system which can generate a man-made world, in which the user can immerse, roam, and operate objects [6].

1.1 History of Virtual Reality

Virtual reality has beginnings that proceeded the time that the concept was coined and formalized. Below is the detailed history of virtual reality how the technology has evolved how this detailed history of virtual reality we look at how technology has evolved and how key explorers have cover the path for virtual reality as we know it today[1].

1. **Panoramic paintings:** The first attempt at virtual reality is the 360-degree murals (or panoramic paintings) from the nineteenth century. These paintings were intended to fill the viewer's entire field of vision, making them feel present at some historical event or scene.

2. **Stereoscopic photos & viewers:**

    a. 1838 : The stereoscope (Charles Wheatstone)
    b. 1849 : The lenticular stereoscope (David Brewster)

3. 1939 : The View-Master (William Gruber)

4. Link Trainer The First Flight Simulator: In 1929 Edward Link created the "Link trainer" (patented 1931) which is the first example of a commercial flight simulator, which was entirely electromechanical.

5. Science fiction story predicted VR: In the year 1930 a story by science fiction by Stanley G. Weinbaum (Pygmalion's Spectacles) contains the idea of a pair of goggles that gives the wearer experience of a fictional world through holographic, smell, taste and touch.

6. In 1960 Morton Heilig's invented Telesphere Mask (patented 1960) and it was the first head-mounted display (HMD).

7. Headsight – First motion tracking HMD: in 1961, two Philco Corporation engineers (Comeau & Bryan) developed the first precursor to the HMD , today it is known as – the Headsight.

8. Artificial Reality: **In** 1969 Myron Kruegere developed a series of experiences he named them as "artificial reality" .

9. 1987 – Virtual reality the name was born

10. 1991 – Virtuality Group Arcade Machines

11. 1992 – The Lawnmower Man: The Lawnmower Man movie introduced the concept of virtual reality to a wider audience.

12. 1993 – SEGA announce new VR glasses

13. 1995 – Nintendo Virtual Boy

14. 1999 – The Matrix

15. **Virtual reality in the 21st century:** The earlier years of 21st century has seen major, rapid advancement in the development of virtual reality. Computer technology has exploded. The year 2016 will be a key year in the virtual reality industry. Multiple consumer devices that seem to finally answer the unfulfilled promises made by virtual reality in the 1990s will come to market at that time [1].

1.2 Definitions of virtual reality

1. Virtual reality has different definitions based on different views i.e, based on technology VR is defined as follows:

2. One of the definitions originates from the human machine interface which is stated [7] as "virtual reality is a natural interaction technology".

3. In [8], the term virtual reality is defined as a means of interaction, by which people can see, operate, and interact with extra complex data through computers.

4. Virtual reality is also defined based on VR devices as follows:

5. Virtual reality as being the provision of a three-dimension reality that is realized by a series of sensor devices like head mounted display, data glove, and so on [9]. In the definition like this, virtual reality is interpreted as a software and hardware environment. This environment simulates a real word in which the user can operate and control the virtual environment by special interacting devices such as input systems, sensor bistouries, and video oculars.

6. Virtual reality is a people-centered closed system that is implemented mainly by computers and uses the corresponding interaction between human and machine with perceptual system.
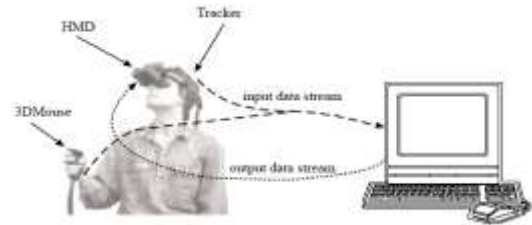
2. VIRTUAL REALITY DEVICES

Fig 1: Basic components of virtual reality

The above figure shows the important components of human-computer-human interaction fundamental to every immersive virtual reality system. The user is equipped with a head mounted display, tracker and three-dimensional mouse, data glove etc. these are optionally manipulation devices. Here the function of input devices is to interact with the VE and output devices helps in feeling of immersion and software is used to control and synchronization of whole environment [2].

The devices of virtual reality are

1. HMD
2. Tracing devices
3. VR glasses
4. Data glove
5. Cyber puck

A virtual environment (VE) is a digital space in which a user's movements are tracked and their surroundings provided. Example of VE is, in a computer game, a user's joystick motions can be tracked and his or her character moves forward, rendering a new environment.

CAVE: The name "CAVE" is a recursive acronym (CAVE Automatic Virtual Environment). The CAVE was researched and developed by the Electronic Visualization Laboratory, at the University of Illinois at Chicago as a tool for scientific visualization. In one of the conference CAVE has achieved international recognition as the successful point of immersive virtual reality system technology, providing a compelling display environment for science, engineering, and art. The goals that motivated the design of the CAVE were to produce a virtual reality environment that was suitable for scientific research and to provide a user interface to steer high performance computing

applications running on remote supercomputers. The CAVE produces a sense of immersion by surrounding a user with wrap-around screens on which images are rear-projected in stereo on the walls and down-projected in stereo onto the floor [3].
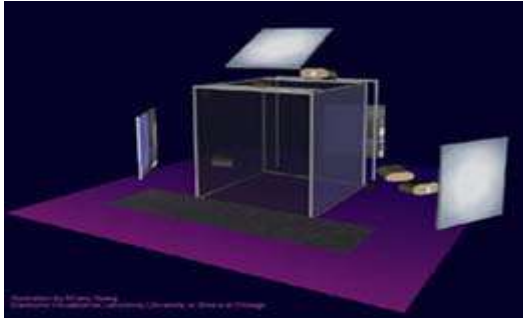

Fig 2: Cave Image

There are different Virtual environments available forms and are determined by the capabilities of the platform or hardware used to create Virtual Environment. Virtual environment hardware is as simple as cellular phone or as complex as a fully immersive virtual reality setup, which incorporates wearable equipment that allows the user to move in the physical environment. Many of the immersive VEs use a head - mounted display (HMD) to provide virtual environments. It comprised of a helmet or headpiece with LCD screens affixed in front of the eyes to provide a wide, stereoscopic view of the computer-generated environment [4].

3. APPLICATIONS OF VIRTUAL REALITY

There are many applications of virtual reality, they are Virtual Reality in the Military, Education, Healthcare, Entertainment, Fashion, Business, Engineering, Sport, Media, Telecommunications, Construction, Film and in Programming Languages.

4. CONCLUSION

As the Virtual reality spread a broad spectrum of ideas and is the challenging research area. Under this technology many researchers and companies are working. Considerable achievements have been done in last few years. As this technology increases, the applications of VR become widen. The VR technology is started in many years back now days the technology is becoming advanced. In the hardware point of view, full sensory cues is not yet achievable even with the most advanced and expensive devices, there exists now a variety of research and commercial solutions successfully useable for practical applications. The above survey gives different applications, devices of VR and the advanced implementation of the same can be consider for the future research work.

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